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REPORT
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TECHNOLOGY ADMINISTRATION
AUTHORIZATION ACT OF 1989

Mr. HOLLINGS, from the Committee on Commerce, Science,
and Transportation, submitted the following

R E P O R T

OF THE

SENATE COMMITTEE ON COMMERCE,
SCIENCE, AND TRANSPORTATION

ON

S. 1191



OCTOBER 3 (legislative day, SEPTEMBER 18), 1989.—Ordered to be printed

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REPORT

[To accompany S. 1191]

The Committee on Commerce, Science, and Transportation, to which was referred the bill (S. 1191) to authorize appropriations for the Department of Commerce's Technology Administration, to speed the development and application of economically strategic technologies, and for other purposes, having considered the same, reports favorably thereon with an amendment in the nature of a substitute and recommends that the bill do pass.

PURPOSE OF THE BILL

The bill as ordered reported authorizes fiscal year (FY) 1990 appropriations for the following activities of the Department of Commerce's (DOC) Technology Administration: Executive Direction; the Offices of Technology Policy and Commercial Affairs; the Japanese Technical Literature Program; and the National Institute of Standards and Technology (NIST), including NIST's core laboratory program, its Industrial Technology Extension Activities, and its Advanced Technology Program (ATP). The bill also sets terms and conditions for assistance to industry under the ATP, requires a new annual industrial technology report, and requires five one-time reports.

BACKGROUND AND NEEDS

The United States no longer can take its leadership in technology for granted. Other nations now have concerted and successful efforts, sponsored jointly by industry and government, to develop and

apply advanced commercial technologies in such fields as advanced electronics, advanced manufacturing, and superconducting materials. The United States no longer leads the world in the several areas of basic technology, and U.S. industries in a wide range of fields find themselves losing both technological leadership and market share. If these trends are allowed to continue, they will have major adverse effects on U.S. economic security, national defense, and the Nation's standard of living. The technology programs of DOC already play an important role in supporting U.S. industrial technology and can do even more to assist U.S. industrial competitiveness.

DOC TECHNOLOGY PROGRAMS

While the principal responsibility for developing and applying new commercial technology lies with the private sector, DOC has long played an important role in assisting U.S. industrial technology.

Congress created NIST's predecessor agency, the National Bureau of Standards (NBS), in 1901 as a scientific and engineering laboratory to provide industry with precise measurements, quality control techniques, and technical data. In effect, the agency provides American industry with many of the fundamental tools necessary to make products in precise, high-quality, and cost-effective ways. It conducts work which benefits entire industries but which no one company can afford to undertake. Today, the agency remains the one Federal laboratory with an explicit mission to aid U.S. science and industry. Much of its recent laboratory research has focused on providing techniques and technical data necessary both to improve manufacturing and to turn new discoveries into successful commercial products.

During the 100th Congress, two major laws significantly upgraded DOC technology programs. The Technology Competitiveness Act (sections 5101-5164 of the Omnibus Trade and Competitiveness Act of 1988, P.L. 100-418) upgraded NBS into NIST and expanded its responsibilities. Under the Act, the traditional NBS laboratory program continues, with NIST directed to conduct research which provides not only important measurement services but also, where appropriate, helps industry develop new basic technologies. The Act also expanded the agency's mission in two other ways: it created new technology extension activities to provide technical assistance to smaller companies, especially small manufacturers, and it created a new ATP to encourage and, in selected cases, financially assist new private sector research efforts in key fields of technology. Even before the Act passed, DOC had played an important role in encouraging the formation of nearly 100 multi-company company research consortia. These consortia, also known as joint research and development ventures, are a cost-effective way for companies to pool resources and develop new basic technologies; each company then uses that technology to develop its own proprietary products.

Subsequently, title II of the NIST Authorization Act for FY 1989 (P.L. 100-519) placed a number of DOC technology programs, including NIST, into a new DOC Technology Administration, headed

by the new position of Under Secretary of Commerce for Technology. In addition to NIST, the Technology Administration includes the Office of the Under Secretary; the Office of Technology Policy and the Office of Commercial Affairs (formerly a single Office of Productivity, Technology, and Innovation); the Japanese Technical Literature Program; the Clearinghouse on State and Local Initiatives on Productivity, Technology, and Innovation; and the National Technical Information Service (NTIS), a self-supporting unit which collects and disseminates unclassified government technical reports.

THE FOREIGN CHALLENGE TO U.S. TECHNOLOGICAL LEADERSHIP

DOC's new responsibilities come at a time when three trends have made industrial technology more important than ever before to U.S. economic success.

First, technology increasingly is the key to economic growth. Natural resources and other traditional advantages are still important but, as the President's Commission on Industrial Competitiveness concluded in 1985: "Technology propels our economy forward. Without doubt, it has been our strongest competitive advantage."

Second, however, the overall situation in American technology is not as strong as it should be. While the United States continues to lead the world in Nobel Prizes and new inventions, other nations often prove better both at manufacturing and at rapidly turning new ideas into successful commercial products. The President's Commission stated the problem this way: "There is not enough research and development with competitiveness as its goal." The Commission added: "Manufacturing technology needs more emphasis. Perhaps the most glaring deficiency in America's technological capabilities has been our failure to devote enough attention to manufacturing or 'process' technology."

Third, American companies increasingly face concerted efforts by industry-government partnerships in other countries to take the lead in important technologies. According to U.S. government statistics, public funds in the European Community's two "Framework Programmes" for industrial research and development (R&D) in key technical areas will total 9.15 billion European Currency Units (\$10 billion). Individual European governments also are spending large amounts of money, often on a matching fund basis with industry. For example, in 1987 the Federal Republic of Germany spent 15.3 percent of its government R&D budget on work related to industrial development; this compares with the 0.2 percent of U.S. government research funds spent that year on industrial development. Japan also continues to expand its industrially-related R&D projects; the most important new effort is the Japan Key Technology Center, which makes grants and loans to industry-led research projects.

While no one suggests that the United States must match European and Japanese R&D investments dollar for dollar, these expanding efforts by major trading partners already have had a major impact.

THE ERODING U.S. POSITION IN KEY TECHNOLOGIES AND INDUSTRIES

The United States no longer leads the world in many of the technologies most important for commercial success and national defense. For example, as early as 1986, a National Research Council report entitled "Advanced Processing of Electronic Materials in the United States and Japan" concluded that Japan led the United States in 8 out of 11 emerging technologies that are central to the future of the semiconductor and opto-electronic industries. A 1989 Department of Defense (DOD) study found Japan significantly ahead of the United States in six technologies deemed critical to long-term U.S. defense—microelectronic circuits, gallium arsenide (a material for computer chips), robotics, optics, superconductivity, and biotechnology. Another sign of erosion is the steadily declining number of U.S. patents going to American inventors. In 1970, over twice as many U.S. patents went to Americans as were awarded to foreign inventors. In 1987, foreign inventors received almost as many U.S. patents as did Americans.

Problems of technology—compounded by problems of trade policy, the cost of capital, and management—have led to a major erosion in the share of industrial markets held by American companies. In 1986, for the first time, the United States ran a trade deficit in high-technology products. Even within America's own home market, the share held by U.S. firms has steadily declined. Table 1 summarizes that decline.

THE EROSION OF THE U.S. SHARE OF TECHNOLOGY MARKETS

[Dollar amounts in millions]

Technology	Pioneered by	U.S. companies' share of domestic American market (percent)				Estimated 1987 value of U.S. Market
		1970	1975	1980	1987	
Phonographs.....	United States.....	90	40	30	1	\$630
Televisions:						
Black and white.....	United States.....	65	30	15	2	175
Color.....	United States.....	90	80	60	10	5,150
Audio tape recorders.....	United States.....	40	10	10	1	500
Video cassette recorders.....	United States.....	10	10	1	1	2,895
Ballbearings.....	Germany.....	88	83	71	71	1,657
Machine tools:						
Horizontal numerically controlled lathes.....	United States.....	¹ 100	¹ 92	70	40	401
Machining Centers.....	United States.....	¹ 100	¹ 97	79	35	485
Telephone sets.....	United States.....	99	95	88	25	2,000
Semiconductors ²	United States.....	89	71	65	64	¹ 19,100
Semiconductor manufacturing equipment ³	United States.....	100	90	75	75	1,856
Cellular telephones.....	Scandinavia-United States.....	(⁴)	(⁴)	(⁴)	40	740
Facsimile machines.....	United States-Japan.....	(⁴)	(⁴)	(⁴)		750

¹ Estimates.

² Data is for semiconductor merchant companies only. U.S. company share includes production of foreign subsidiaries operating in the United States.

³ Estimates only. No official data exists.

⁴ Not introduced into the U.S. market.

Source: Council on Competitiveness, "Picking Up the Pace: The Commercial Challenge to American Innovation," Sept. 1988, page 15, using data from the U.S. Department of Commerce.

CRITICAL NEEDS IN TECHNOLOGY

Testimony before the Committee during the past three years suggests two major points regarding DOC technology programs.

First, the internal laboratory program at NIST should remain active and up-to-date in a wide range of industrial technologies. The renewed emphasis on quality in manufacturing and products, as well as the increasing pace of technological development, makes NIST research and associated technical services even more important to U.S. industry than before.

Yet NIST's laboratory program has difficulty keeping pace with industry's needs. Dr. John McTague, former Acting Science Advisor to President Reagan and currently Vice President for Research at the Ford Motor Company, summed up the situation in a statement before the Committee:

In the last 15 years, the U.S. gross national product has shown real growth of more than 50 percent. In that same period, U.S. industry has increased its research and development funding by more than 80 percent in constant dollars. Federal R&D spending has had real growth of more than 50 percent over the same period. Both industry and government have made this investment because our national economic strength and our national security have relied more and more heavily on technology. NIST, which targets its research and services on the most important elements of our industrial R&D and which supports the entire economy, has had zero real growth over those years.

In rough terms, the NIST budget would have to be doubled to be equivalent with the R&D spending of its primary customers.

A recent report by the National Conference of Standards Laboratories, an industry group, identified 154 "deficiencies"—areas of technology where NIST's current measurement and quality control efforts do not meet industry's needs.

Second, industry witnesses testified before the Committee that several areas of technology are particularly important for the future of the U.S. economy. These are fundamental product and process technologies which, when developed, will find widespread applications throughout the economy. They include the following.

Advanced imaging electronics (also known as high-definition systems).—High-definition television (HDTV) is one, but only one, of several major applications of this new technology. Other applications include advanced computer workstations, computer-aided design and manufacturing, medical diagnostics, advanced printing and publishing, air traffic control monitors, and defense systems. Japan's state-owned broadcasting corporation, NHK, already has invested up to \$700 million to develop HDTV alone. Japan's new "Giant Electronics Project" will help build large display screens and recently received \$100 million from the Ministry of International Trade and Industry (MITI). In Europe, the "Eureka-95" project is spending \$232 million to develop HDTV; half the funds come from government.

Advanced manufacturing.—A 1987 report by the National Research Council, entitled "Directions in Engineering Research," concluded that "there are major deficiencies in research aimed at manufacturing technology. The underlying knowledge base is quite limited and * * * the flow of knowledge from research to application needs strengthening." New manufacturing technology offers the possibility of great improvements in quality, flexibility, and production speed, but recent studies suggest that the Japanese are far more advanced in developing and applying this technology than are most American companies. The United States runs the risk of not only becoming dependent on foreign technology but also of losing competitiveness because the newest technology goes to local companies in those countries before American can obtain it. U.S. consortia in the manufacturing area have formed and offer the potential for major advances in this field.

Superconductors.—A January 1989 report by a committee of the White House Science Council made these points about research on superconducting materials:

While there is a high level of activity in U.S. industry today, much of it is scattered and in monitoring groups and is unlikely to survive in what we believe will be a long distance race. * * * [T]he Japanese government has put in place * * * a structure that will support, coordinate and sustain various individual industrial efforts through the early stages of this new technology and look for applications * * * Our recommendations are aimed at providing in the American environment an equivalent stability in the long term race for applications.

Both this committee and the Council on Superconductivity for American Competitiveness have proposed various types of U.S. industry-government consortia to help companies develop applications. Meanwhile, the Japanese continue to make major investments in this field. Testimony before the Committee states that the most recent Japanese research effort totals \$800 million.

Advanced ceramic and composite materials.—A 1988 report by the Office of Technology Assessment on advanced ceramics and composites concluded that these new materials technologies "will be a determining factor in the global competitiveness of U.S. manufacturing industries in the 1990s and beyond." The report went on to note that materials account for as much as 30 to 50 percent of the costs of most manufactured products and that new materials can reduce costs and improve performance.

X-ray lithography.—The beams of light now used to etch circuit patterns onto semiconductors are relatively wide and will be unable to etch circuit lines for the most densely-packed chips of the mid-1990s and beyond. X-rays, rather than light, are likely to be the best technology for making these dense chips. According to testimony before the Committee, Japanese government laboratories and companies already have built or are building 19 of the expensive facilities needed for X-ray lithography. Only one such facility exists in the United States and no arrangement has yet been reached to allow most U.S. semiconductor companies to have access

to it. There is a need to ensure that the United States does not fall behind in this essential semiconductor production technology.

In all five of these areas, and others, there is a need both for the measurement and quality control services of NIST's internal laboratory program and for greater efforts by industry, with Federal encouragement and assistance, to develop basic technologies and applications that can be used by American companies to develop competitive, timely products.

LEGISLATIVE HISTORY

During the first half of 1989, the Committee held two hearings on technology and economic competitiveness, a May 9 hearing on industry-government cooperation to speed the commercialization of new technologies and a June 6 hearing on the reauthorization of Doc technology programs. The Subcommittee on Science, Technology, and Space also held a hearing on developing a national technology strategy for high-definition television (HDTV) on May 16.

On June 15, Senator Hollings introduced S. 1191, cosponsored by Senators Bentsen, Bryan, Rockefeller, Bingaman, Inouye, Lott, and Gore. The Committee held a hearing on S. 1191 on July 25, and heard from both DOC and outside witnesses.

On August 1, the Committee in open executive session considered a revised version of S. 1191 in the form of an amendment in the nature of a substitute. The amendment was ordered reported without objection. The bill, as ordered reported, included the text of S. 1001, a bill to require the Secretary of Commerce to submit to the President and Congress a report concerning the establishment of a domestically-based HDTV industry. Senator Gore introduced S. 1001 on May 16.

SUMMARY OF MAJOR PROVISIONS

1. Section 3 would authorize FY 1990 appropriations of \$4,675,000 to carry out the executive and analytical activities performed by the Technology Administration with \$1,013,000 for Executive Direction (Office of the Under Secretary for Technology), \$2,662,000 for Technology Policy and Commercial Affairs, and \$1,000,000 for Japanese Technical Literature.

2. Section 4 would authorize FY 1990 appropriations for NIST. The NIST internal laboratory program would be authorized at \$196,360,000 an increase of \$52,510,000 or 36 percent over the FY 1989 level of \$143,850,000. Most of the increases would be areas where DOC has requested increases from the Office of Management and Budget (OMB). The section also would authorize \$4,000,000 for FY 1990 Industrial Technology Extension Activities; these sums would be in addition to FY 1990 authorizations contained in the Technology Competitiveness Act.

3. Section 5 would authorize FY 1990 appropriations of \$100,000,000 for the ATP, in order to assist industry-led joint R&D ventures and small businesses. The section also sets forth terms and conditions for the ATP, including the conditions under which a foreign-owned company may participate.

4. Section 6 would require the Secretary of Commerce to submit a report concerning the establishment of a domestically-based HDTV industry in the United States.

5. Section 7 would amend the NIST Act to allow the Secretary to hire temporary personnel to help staff the ATP.

6. Remaining sections would require an annual industrial technology report and four one-time reports on issues of technology and competitiveness.

ESTIMATED COSTS

In accordance with paragraph 11(a) of rule XXVI of the Standing Rules of the Senate and section 403 of the Congressional Budget Act of 1974, the Committee provides the following cost estimate, prepared by the Congressional Budget Office:

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, August 21, 1989.

Hon. ERNEST F. HOLLINGS,
*Chairman, Committee on Commerce, Science, and Transportation,
U.S. Senate, Washington, DC.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the attached cost estimate for S. 1191, the Technology Administration Authorization Act of 1989.

If you wish further details on this estimate, we will be pleased to provide them.

Sincerely,

ROBERT D. REISCHAUER,
Director.

CONGRESSIONAL BUDGET OFFICE—COST ESTIMATE

1. Bill number: S. 1191.

2. Bill title: Technology Administration Authorization Act of 1989.

3. Bill status: As ordered reported by the Senate Committee on Commerce, Science, and Transportation, August 1, 1989.

4. Bill purpose: S. 1191 would authorize appropriations for fiscal year 1990 for the Department of Commerce's Technology Administration and its National Institute of Standards and Technology (NIST). In addition to the amount that would be authorized for NIST's internal research and industrial technology extension activities, the bill would authorize \$100 million for fiscal year 1990 for the Advanced Technology Program within NIST. In addition to the specific amounts provided, S. 1191 would authorize for fiscal year 1990 such sums as may be necessary for adjustments in salary, retirement, and other employee benefits that may be provided for by law. The bill also would require NIST to undertake a number of studies during the first half of fiscal year 1990.

For fiscal year 1990, the total amount specifically authorized in the bill for the Technology Administration and NIST is \$305.1 million. The President's request for these agencies is \$156.3 million.

5. Estimated cost to the Federal Government:

[By fiscal year, in millions of dollars]

Authorizations	1990	1991	1992	1993	1994
Specified (Function 370):					
Technology Administration.....	4.7				
NIST.....	200.4				
Advanced Technology Program.....	100.0				
Subtotal.....	305.1				
Estimated (Function 920).....	4.5				
Total authorizations.....	309.6				
Estimated outlays.....	238.8	64.7	6.1		

The costs of this bill fall within budget function 370.

Basis of estimate: This estimate assumes that the full amounts authorized will be appropriated prior to the beginning of fiscal year 1990. The increase for salary, retirement and other employee benefits that may be provided for by law for fiscal year 1990 is estimated consistent with the Concurrent Resolution on the Budget for fiscal year 1990 (H. Con. Res. 106). Outlays for new programs are based on historical spending patterns of similar programs.

6. Estimated cost to State and local governments: None.

7. Estimate comparison: None.

8. Previous CBO estimate: None.

9. Estimate prepared by: Douglas Criscitello.

10. Estimate approved by: James L. Blum, Assistant Director for Budget Analysis.

REGULATORY IMPACT STATEMENT

In accordance with paragraph 11(b) of rule XXVI of the Standing Rules of the Senate, the Committee provides the following evaluation of the regulatory impact of the legislation, as reported.

S. 1191, as reported, would provide authorization of appropriations to NIST and other DOC technology programs for FY 1990. The bill also would establish terms and conditions for the ATP.

The bill confers no new regulatory authority on NIST, the Technology Administration, or any other unit of DOC. Implementation of the legislation will not increase Federal regulation of any individuals or businesses, and thus in this respect will not result in increased Federal regulation, economic effect, impact on personal privacy, or additional paperwork. The Secretary will make decisions regarding applications for financial assistance under the ATP and will require applicants to submit certain information. However, all such business relationships will be voluntary.

In terms of economic effect, the bill proposes to increase Federal expenditures for technology research, but this technology research is an investment which will increase U.S. economic competitiveness and promote economic growth.

In terms of paperwork, the bill requires an annual industrial technology report and the following one-time reports: a report from the Secretary of Commerce concerning the establishment of a domestically-based HDTV industry; a report from the Secretary on a strategy for reducing the cost of capital; a report from the Secre-

tary on collaborative programs between DOC and the National Science Foundation (NSF) on the creation and commercialization of college and university research; a report from the Secretary on a possible privately-funded Quality Institute; a report from the Secretary on shared manufacturing; and a report from Director of the Office of Science and Technology Policy (OSTP) on a strategy for improving the university research capabilities of those States which historically have received relatively little Federal R&D funding.

—SECTION-BY-SECTION ANALYSIS

SECTION 1.—SHORT TITLE

This section states that the bill may be cited as the "Technology Administration Authorization Act of 1989".

SECTION 2.—STATEMENT OF POLICY

This section contains congressional findings that, in order to help U.S. industries to speed the development of new products and processes and in order to maintain the economic competitiveness of the Nation, targeted increases are required in the programs and activities of the DOC's Technology Administration (hereafter in this report referred to as the "Administration") and NIST (hereinafter also referred to as the "Institute").

SECTION 3.—TECHNOLOGY ADMINISTRATION

Under section 3, there is authorized to be appropriated to the Secretary of Commerce (hereinafter referred to as the "Secretary"), to carry out executive and analytical activities performed by the Administration, \$4,675,000 for FY 1990, which shall be available for the following line items:

- (1) Executive Direction, \$1,013,000.
- (2) Technology Policy and Commercial Affairs, \$2,662,000.
- (3) Japanese Technical Literature, \$1,000,000.

The Committee continues to see the Technology Administration not only as the focal point of DOC's technology activities but also as a major forum for policy analysis and for interactions with both industry and State technology and innovation programs. The Committee urges the executive and analytical offices of the Administration to expand its discussions with industry and the States on how Federal technology and Federal policy and programs can further bolster competitiveness and productivity. The Committee also encourages the leadership of the Administration, in cooperation with NIST officials, to explore innovative ways in which DOC and its experts on advanced manufacturing can work with States, localities, and educational institutions to improve the skills of manufacturing employees.

The Committee intends that all FY 1990 salaries and benefits for civil service personnel in the Office of Technology Policy and the Office of Commercial Affairs be paid for by salary funds appropriated pursuant to the authorization in the line item stated in paragraph (2). In the event that additional funds are appropriated pursuant to authorizations for other programs administered by either

of these offices, particularly for the Clearinghouse on State and Local Initiatives on Productivity, Technology, and Innovation, the Committee intends that those additional appropriations not be used for civil service salaries or benefits but for other objects relevant to the programs' purposes, including workshops, analyses, publications and other information, and, as appropriate, travel.

The Committee continues to support the Japanese Technical Literature Program strongly. Today it is more important than ever for both Federal officials and industrial scientists and engineers to acquire information on technical developments and research programs in Japan. The authorization level contained in the line item stated in paragraph (3) is higher than the President's request of \$425,000. The Committee intends that the increase be used, to the extent funds are appropriated for that increase, in part to provide additional support for existing activities such as directories, translations, and special analyses of specific technical fields and in part to expand the Program's connections with professional societies and industry associations, including, when appropriate, jointly-funded analyses and publications on Japanese technical developments in economically-important technologies.

SECTION 4.—NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY

Subsection (a) states that Congress finds that the Institute can assist U.S. industry in three ways to speed the commercialization of new products and processes: through the Institute's internal laboratory research and services programs, which provide industry with precise measurement and quality assurance techniques and with new generic manufacturing and process technologies; through its technology extension activities, which disseminate technical information and advanced manufacturing techniques to a wide range of companies; and through its ATP, which can promote and assist industry's own efforts to develop new generic technologies.

Subsection (b) authorizes FY 1990 appropriations for NIST's internal laboratory program. There is authorized to be appropriated to the Secretary, to carry out the internal science and technology research and services activities of the Institute, \$196,360,000 for FY 1990. The bill includes increases for research to develop new measurement techniques, quality control techniques, and, in some cases, new generic processing technologies in the following areas: chemical processing, atomic-level performance of electrical and optical systems, high-performance composite materials, steel technology, advanced imaging electronics, superconductivity, lightwave and optoelectronics, advanced semiconductors, automation, bioprocess engineering, fire and building research, and computer security. The bill also authorizes appropriations for in-house NIST facilities, including the Cold Neutron Research Facility and a new NIST computer.

The Committee continues to believe that the research and technical services provided by NIST's internal laboratory program are of great importance to the Nation and to its economic future. The Committee notes that the laboratory program has received little real increase in funding in recent years and therefore that targeted

increases to meet industry's growing need for technical assistance are definitely warranted.

Subsection (c) provides authorizations for NIST's technology extension activities. In addition to the sums already authorized by statute to be appropriated for FY 1990 for Regional Centers for the Transfer of Manufacturing Technology and for assistance to State Technology extension services, there is authorized to be appropriated to the Secretary to carry out the industrial technology extension activities of the Institute for FY 1990, \$4,000,000, of which \$2,000,000 shall be available for the Technology Evaluation Program and \$2,000,000 shall be available for the Institute's management of its industrial technology extension activities.

The Committee notes that two other programs under NIST's technology extension activities have already received FY 1990 authorizations under the provisions of the Technology Competitive-ness Act. These two programs are the Regional Centers for the Transfer of Manufacturing Technology and cooperative agreements with State technology extension services. The Committee intends that the authorizations included in subsection (c) are in addition to those other FY 1990 authorizations.

The Committee intends that NIST expand its relationship with State governments in order to provide additional channels through which NIST expertise, services, and technology can be made available to a wide range of businesses, particularly small businesses, throughout the Nation. The Committee encourages NIST whenever possible to work with existing business outreach and assistance programs, including those run by the States, the Small Business Development Centers, the Trade Adjustment Assistance Centers, and, where appropriate, private companies.

Subsection (d) deals with transfers. Funds may be transferred among the line items listed in subsection (b), so long as—

(A) the net funds transferred to or from any line item do not exceed 10 percent of the amount authorized for that line item in such subsection; and

(B) the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science, Space, and Technology of the House of Representatives are notified in advance of any such transfer.

In addition, the Secretary may propose transfers to or from any line item exceeding 10 percent of the amount authorized for the line item in subsection (b), but such proposed transfer may not be made—

(A) unless a full explanation of any such proposed transfer and the reasons therefore are transmitted in writing to the Speaker of the House of Representatives, the President of the Senate, and the appropriate authorizing committees of the House of Representatives and the Senate; and

(B) until the expiration of the 30-day period following the transmission of such written explanation.

Subsection (e) states that the Secretary is authorized and directed, to the extent provided in appropriations Acts, to provide up to \$125,000 from FY 1990 funds appropriated to the U.S. and Foreign Commercial Service (hereinafter referred to as the "Service") for a one-year project to place a technical standards expert in Saudi

Arabia for the purpose of helping the Kingdom of Saudi Arabia to write product standards that treat U.S. exports fairly, providing that every dollar contributed by the Secretary is matched by at least one dollar raised by the private sector. The Director of the Institute (hereinafter referred to as "Director") shall assist the Director General of such Service in selecting an appropriate technical expert and shall provide appropriate technical support.

The Committee believes that it is important for the United States to participate, when invited, in efforts by foreign governments to rewrite standards codes which affect the importation of American-made goods and services. The Committee also believes that whenever possible private American companies should bear the cost of hiring standards experts to participate in these efforts. However, in some cases total private financing may not be practical. In the case of standards efforts in Saudi Arabia, the Committee believes that some cost-sharing by the Federal Government is appropriate if the American private sector is unable to raise the full amount needed to hire a standards expert. The Committee believes that such a person would be engaged primarily in trade promotion rather than technical standards work and therefore believes, subject to the availability of funds, that any Federal contribution towards the hiring of such an individual might best come from the DOC agency most responsible for trade promotion, the Service. The Committee also believes, however, that NIST should render any necessary technical advice or assistance that the Director General of the Service may request.

Subsection (f) directs the creation of a new NIST Office of Industrial Technology Services to supervise the centers program, the Institute's assistance to State technology programs, and such other activities or programs as the Secretary, the Under Secretary, or Director may specify.

NIST's new technical extension activities to aid industry are important and need to be coordinated and managed through a single office within the Institute. This office would be a good location in which to place NIST's ATP.

SECTION 5.—NIST ADVANCED TECHNOLOGY PROGRAM

Subsection (a) presents findings and a statement of policy. Congress finds and declares the following:

(1) It is in the national interest for the Federal Government to encourage and, in selected cases, provide limited financial assistance to industry-led private sector efforts to increase research and development in economically critical areas of technology. Further, both joint research and development ventures (hereafter in this section referred to as "joint ventures") and selected research assistance to small firms are established and effective ways to create economically-valuable new technology. Joint ventures are a particularly effective and appropriate way to pool resources to conduct research that no one company is likely to undertake but which will create new generic technologies that will benefit an entire industry and the welfare of the Nation.

(2) In accordance with existing national policy, both the technology developed by any joint venture supported by DOC and the re-

sulting products will be made available, on a license and royalty basis and subject to the terms and conditions listed in this section, to nonparticipants.

(3) When a joint venture receives financial assistance from DOC, the technology resulting from the joint venture should be licensed in such a way that it promotes the domestic manufacture of resulting products and components.

Subsection (b) provides the FY 1990 authorizations for the ATP. In addition to any other sums otherwise authorized by the legislation, there is authorized to be appropriated to the Secretary, pursuant to section 28 of the Act of March 3, 1901 (15 U.S.C. 278n), and subject to the terms specified in subsections (c) and (d) of this section, \$100,000,000 for FY 1990, which shall be available for the following line items:

(1) Assistance to industry-led joint ventures to create and test generic enabling technologies, \$75,000,000, which shall be available to support joint ventures in the following areas:

(A) advanced imaging electronics, including advanced television;

(B) advanced manufacturing;

(C) applications of high-temperature superconducting materials;

(D) advanced ceramic and composite materials; and

(E) semiconductor production equipment, specifically to develop X-ray lithography as a method of producing semiconductor chips.

(2) Assistance to industry-led joint ventures in other areas of technology which the Secretary and the Director believe are of great economic importance to the United States, \$13,000,000.

(3) Assistance to U.S. small businesses which have received Small Business Innovation Research Program Phase II awards, \$10,000,000.

(4) Program management, analyses, and workshops, \$2,000,000.

The Committee continues to believe that the main mission of the ATP is to encourage private companies to undertake more engineering R&D in economically-important areas of technology, with the aim of speeding the commercialization of new domestic products and improving manufacturing. As a result, the Committee has authorized appropriations under the line item stated in paragraph (4) for analyses and workshops as well as program management and intends that DOC play an active role in serving as a forum and catalyst for encouraging new private sector RUD efforts, including joint R&D ventures ("consortia").

In some areas of technology seed money from DOC can play an important role in stimulating and accelerating private sector research efforts. Seed money can be particularly valuable for joint R&D ventures in areas of technology which promise to have wide and beneficial applications throughout the U.S. economy but where the benefits may not be immediate and where significant technical obstacles exist. Based on analyses and industry views presented to the Committee, the Committee believes that the Nation would benefit greatly from ATP financial assistance in the five technical areas listed in subsection (b)(1).

The Committee has not authorized specific amounts for these five technologies, since no one knows in advance how many proposals industry groups may submit, how much funding they may request, or which proposals will have the greatest merit. Nonetheless, DOC should consider the following suggested levels for the five technologies:

- Advanced imaging electronics (also known as high-definition systems, which includes but is not limited to HDTV), \$30,000,000;
- Advanced manufacturing, \$20,000,000;
- Superconducting materials, \$10,000,000;
- Advanced ceramic and composite materials, \$5,000,000; and
- X-ray lithography, \$10,000,000.

The Committee believes that industry groups should decide which particular types of technical projects to propose, which funding requests to make, and how to conduct the associated research. That is, the activities of any such joint venture should be truly "industry-led." The Committee notes that industry leaders already have identified several specific technical barriers and needs in these five technical areas. For example, in the area of advanced imaging electronics, the principal technical needs appear to be in the areas of advanced displays, display processing, advanced manufacturing techniques for electronics, and perhaps advanced video tape recorder technology. In advanced manufacturing, new generations of computer controllers and robotics appear particularly important. In superconductivity, much interest focuses on developing prototype computer chips using new high-temperature superconductors.

In general, the research funded by the ATP should aim at the development of basic, generic technologies, the work should be directed toward helping American companies develop new types of commercial products or the manufacturing techniques necessary to make those products, special attention should be paid to overcoming significant technical obstacles to the successful commercialization of these technologies, and, whenever possible and appropriate, the joint R&D ventures receiving aid from the Secretary should take advantage of NIST expertise and quality control techniques. Furthermore, the Committee urges the Secretary to give special consideration to proposals which focus on the process technology and manufacturing techniques necessary to achieve commercially-important applications and products; manufacturing is an area in which American technology often lags behind foreign competitors. In addition, the Committee directs the Secretary to be sensitive to issues of fairness and equity. To the extent possible, DOC assistance should help build technological competence broadly throughout a given industry rather than assist only one group of companies within that industry, and the Secretary also should pay particular attention to the opportunities afforded small businesses to participate in DOC-assisted joint ventures.

Because the purpose of the ATP is to support industry-led efforts to develop new generic technologies, the Committee intends that any ATP-assisted industry effort in the field of advanced imaging electronics focus on the creation of new basic imaging technology and not on transmission standard issues. The Committee does not

see the transmission standard question arising in the context of the ATP.

In subsection (b)(2), the Committee has recommended an additional \$13,000,000 for seed money for other, as yet unspecified, areas of technology. The Committee recognizes that technology changes quickly and that new or unforeseen needs and opportunities may arise where the ATP can serve an important role. For example, interest has grown recently in possible research to increase the contributions that information technology can make to improving productivity in the service and educational sectors. In addition, industry interest in data network technology appears to be growing. The Committee believes that some ATP funds should be available for the Secretary to respond to proposals in areas such as this one and accordingly recommends this additional \$13,000,000.

Small businesses in the United States contribute greatly to both the development of new technology and the creation of new jobs. For that reason, subsection (b)(3) would authorize \$10,000,000 for awards to companies whose previous Small Business Innovation Research Program phase II awards have demonstrated that they have high-quality technical ideas. The Committee intends that ATP awards to small businesses be made on a competitive basis, with the winners selected on the basis of their technical merit and their likely contribution to economically important technical fields.

Subsection (c)(1) sets general terms and conditions for aid to joint R&D ventures. Subsequent to any appropriation made pursuant to the authorizations in subsection (b) (1) and (2) of this section, the Secretary shall invite requests for financial assistance from existing or proposed joint ventures in the designated technical areas. If requests are made, the Secretary, after an appropriate review of the technical and economic merits of each request, shall judge which individual requests or combination thereof, if any, merit assistance and shall decide what type and level of assistance each such meritorious proposal shall receive, providing that in addition to the terms and conditions set forth in section 28 of the Act of March 3, 1901 (15 U.S.C. 278n), as amended by section 7 of the bill, the Secretary shall make no financial awards of any funds or loan guarantees appropriated pursuant to the authorizations contained in subsection (b)(1) of this section unless and until—

(A) the joint venture is led by at least two North American companies (as defined in subsection (g) of this section);

(B) the joint venture demonstrates that it has raised, or has firm commitments for, private funds which exceed the level of Federal funds that the joint venture has requested from the Secretary;

(C) the joint venture has developed and submitted to the Secretary a business plan which, in the judgment of the Secretary adequately—

(i) states a clear and focused research and development agenda, including the prototype products and production processes to be created and how that research agenda complements related research projects already being funded by Federal departments or agencies;

(ii) provides assurance that the joint venture will have a sound management team;

(iii) demonstrates that a party to the joint venture, acting on such joint venture's behalf, has filed a written notification with the Attorney General and the Federal Trade Commission, as required under section 6 of the National Cooperative Research Act of 1984;

(iv) provides, as appropriate, for participation in the joint venture by small businesses owned by U.S. citizens;

(v) considers metrology needs, and as appropriate, draws upon the technology, expertise, and facilities in the Institute's laboratories;

(vi) sets forth provisions regarding the disposition of intellectual property resulting from the joint venture, including the rapid transfer of that intellectual property to members of the joint venture; the licensing, as appropriate, of the intellectual property to other North American companies and to foreign companies, in accordance with the provisions set forth in subsection (d) of this section; and, as appropriate, requirements for royalties which will return funds to the investors in the joint venture, including the U.S. Government; and

(vii) sets forth reporting and auditing procedures; and

(D) the Secretary, after an appropriate review of the business plan, judges that the proposed research and development agenda and the proposed management team have high technical merit.

The Committee intends that the Secretary make the final decisions regarding the allocation of any Government funds that may be appropriated pursuant to this ATP authorization. The Secretary, acting in accordance with the provisions of the Technology Competitiveness Act and this section, has the discretion to decide how many ATP awards to make in a given area of technology and how large to make each award, and to specify the timing and duration of each award.

The Committee has included the requirement for a business plan in order to ensure that industry proposals are well conceived, technically and commercially feasible, and financially and managerially sound. The Committee believes that taxpayer funds should be used only if existing or proposed joint ventures have sound plans and demonstrated capabilities.

The Committee has used the term "North American company" in recognition of the fact that the United States and Canada have recently signed a Free Trade Agreement and that, in approving that pact, Congress has declared its general intention to encourage economic cooperation between the two nations and reduce economic barriers. The Committee believes, of course, that the purpose of the ATP is to aid U.S. companies, but the Committee also believes that joint ventures applying to the Secretary for financial assistance should feel free to include, if they wish, legitimate Canadian companies, that is, companies which are owned by Canadian citizens and not simply subsidiaries of third-nation companies.

Furthermore, subsection (c)(1)(A) states that, in order to be eligible to request ATP funds, a joint venture must be "led by" at least two North American firms. By this, the Committee intends that funding be restricted to joint ventures which have been organized

and headed by at least two firms from the United States and Canada (although these ventures may include foreign companies, as provided in subsection (d) below), as opposed to joint ventures which may include North American members but have been organized by foreign companies.

Subsection (c)(2) states that the Secretary may not make an award to a joint venture for the performance of research and development, or for construction of any research or other facility, unless the award is made using competitive procedures or other merit-based procedures.

The Committee believes strongly that the Secretary should use merit-based procedures to evaluate the technical and economic merits of competing proposals and that the Secretary, not Congress, should make decisions regarding which specific industry-led proposals deserve to receive funding under the ATP. The Committee opposes any Congressional effort to earmark ATP appropriations for specific projects and emphasizes that no earmarked or non-competitive ATP award to a specific applicant, company, or institution is authorized under this or any earlier NIST authorization legislation.

The Committee does not intend to specify which particular type of mechanism the Secretary should use to evaluate the technical merits of proposals but does not believe that it should be taken from one of three methods: review by internal NIST scientists and engineers, assembly of review panels of the type used by NSF, or use of National Research Council review panels. The review of economic merits should include an analysis of how much the proposed research is likely to contribute to U.S. industry and jobs. To the extent appropriate, the Secretary should ensure that review panels do not know the identities of the companies involved in the applications and that steps are taken to limit any conflicts of interest on the part of reviewers.

Subsection (d) sets rules regarding participation and licensing by foreign companies and non-members of a joint venture. Paragraph (1) states that, in addition to the terms and conditions set forth in section 28 of the Act of March 3, 1901 (15 U.S.C. 278n), and subsection (d) of this section, the terms and conditions set forth in paragraphs (2) and (3) of this subsection also shall apply to any joint venture which receives any financial assistance from the Secretary pursuant to the authorizations provided in subsection (b) (1) or (2) of this section.

Paragraph (2)(A) states that no joint venture which contains a foreign company or a subsidiary thereof shall be eligible to receive financial assistance from the Secretary, and no foreign company shall participate in any joint venture which has received financial assistance from the Secretary, unless—

(i) the foreign company is prepared to make material contributions to the joint venture and the Secretary, after such consultations with the North American companies belonging to the joint venture or proposed joint venture as the Secretary considers appropriate, certifies that the foreign company's contributions and its participation in the joint venture would be in the interests of the United States;

(ii) the foreign company has already made and agrees to make a substantial commitment to the United States market, as evidenced by investments in the United States in long-term research, development, and manufacturing (including the domestic manufacture of major components and subassemblies); significant contributions to employment in the United States; and agreement with respect to any technology arising from the joint venture to manufacture within the United States products resulting from that technology, to procure parts and materials from competitive North American suppliers, and to support a North American supplier infrastructure;

(iii) the foreign company's home market affords reciprocal treatment to U.S. companies comparable to that afforded the foreign company in the United States, as evidenced by affording comparable opportunities for U.S. companies to participate in any joint ventures similar to those authorized under the bill; by encouraging local investment opportunities for U.S. companies that are comparable to investment opportunities for foreign companies in the United States; and by affording protection for the intellectual property rights of U.S. companies; and

(iv) the parent and affiliate organizations of the foreign company have not been identified on two or more occasions within the previous five years as a foreign manufacturer, producer, or exporter within the meaning of section 771(9)(A) of the Tariff Act of 1930 (19 U.S.C. 1677(9)(A)) in proceedings that have resulted in or involved a final dumping or countervailing duty determination.

Paragraph (2)(B) states that in the event the Secretary certifies a foreign company under subparagraph (A)(i) of this paragraph and certifies that the foreign company meets the requirements set forth under subparagraphs (A)(ii) through (iv) of this paragraph, the Secretary shall waive the prohibition on the foreign company's participation and allow the foreign company to participate in the joint venture, subject to such terms and conditions as the Secretary may specify.

Under paragraph (2)(C) the Secretary shall monitor the participation of the foreign company in the joint venture, shall periodically report to Congress on the participation of foreign companies in federally-assisted joint ventures, and shall suspend the foreign company and its employees from continued participation in the joint venture if the Secretary determines that the foreign company or its home market has violated any of the criteria set forth in subparagraph (A)(i) through (iv) of this paragraph or any of the terms and conditions the Secretary may set under the provisions of subparagraph (B) of this paragraph.

The Committee can envision cases in which a foreign-owned company already is making contributions to the American economy and can make important technical and financial contributions to a specific DOC-assisted joint venture. Therefore, the Committee does not recommend a blanket prohibition on foreign participation in DOC-assisted consortia. The Committee believes strongly, however, that a foreign company should meet two sets of tests before a joint

venture in which that company wishes to participate receives DOC funds pursuant to the authorizations in subsection (b) (1) and (2).

First, the U.S. and other North American companies in the joint venture must propose to include the foreign company in that organization. Joint R&D ventures are voluntary associations, and each one should use such rules as it deems appropriate to decide membership. The final decision on which firms are allowed to join a joint venture must rest with the corporate members of that joint venture. In making this point, the Committee notes, for example, that under one major European program, the Eureka program, foreign companies (including American) are allowed to participate in government-assisted research projects but only if all of the European companies participating in a given project agree to the foreign company's participation.

Second, if a proposed or existing joint venture contains one or more foreign companies and requests ATP assistance, or if a joint venture already receiving DOC financial assistance under the ATP wishes to add one or more foreign companies, the Secretary must approve the participation of each such foreign company, according to the process laid out in subsection (d)(2).

As a first step under this process, the foreign company must meet all three criteria listed in paragraph (2)(A) (ii), (iii), and (iv). The Committee does not believe that taxpayer funds should assist a foreign company which does not have manufacturing and R&D facilities in the United States, or whose home market does not afford comparable treatment, or which has more than once violated U.S. antidumping or countervailing duty laws. With regard to the "commitment" provision of paragraph (2)(A)(ii), the Committee finds that more is required than just "screw-driver" operations, whereby imported major components and subassemblies are assembled into a final product with as few U.S. employees as possible. Hence, the foreign company's investment shall include investment in domestic manufacture of major components and subassemblies. With regard to paragraph (2)(A)(iv), the Committee intends that a foreign company is not eligible if that company, or its parent, or direct affiliates have together been cited, after due process, two or more times within the previous five years in proceedings that have resulted in or involved either final dumping determinations (within the meaning of section 731 of the Tariff Act of 1930, 19 U.S.C. 1673) or final countervailing duty determinations (within the meaning of section 303 of the Tariff Act of 1930, 19 U.S.C. 1303), or a combination of the two types of determinations. The Committee intends that the Secretary determine whether a given foreign company meets these three criteria, after an objective review of the evidence and after giving the foreign company an opportunity to submit relevant evidence.

Next, the Secretary, as provided in paragraph (2)(A)(i), must certify, after such consultations with the North American members as the Secretary considers appropriate, that the foreign company's contributions and its participation in the joint venture would be in the interests of the United States. If the Secretary so certifies, and if the Secretary judges that the foreign company meets the three criteria set forth in paragraph (2)(A) (ii), (iii), and (iv), then the

Committee intends that the Secretary shall waive the prohibition on that foreign company's participation.

With regard to the three criteria set forth in paragraph (2)(A) (ii), (iii), and (iv), the Committee does believe that at least a few foreign companies are likely to be able to meet these criteria. For example, in the case of advanced television at least two Western European companies have made substantial investments in the United States in long-term research, development, and manufacturing and have made significant contributions to employment in the United States. The Committee further notes that several government-aided programs in Western Europe have allowed U.S. companies into their R&D projects. While the Secretary is to make the final judgments regarding which foreign firms meet these three criteria, the Committee does believe that these actions to make substantial investments in the United States and to admit U.S. firms to foreign R&D projects should be considered as important evidence when judging whether or not specific Western European companies meet these requirements.

The Committee further intends that, when a joint venture containing a foreign company requests ATP funds and asks the Secretary for a determination of the foreign company's eligibility, the Secretary's determination of eligibility must be made prior to any decision regarding the allocation of funds among competing proposals in the relevant technical area. Also, to the extent possible both reviewers and the Secretary shall make evaluations among competing requests without regard to whether or not a given proposal contains an eligible foreign company. In addition, the Committee intends that under subsection (d)(2)(C), the Secretary's authority to impose terms and conditions upon eligible foreign companies participating in DOC-assisted joint ventures shall be limited to the terms and conditions needed to ensure continued compliance with this section's eligibility criteria. Such terms and conditions shall not involve operational requirements.

Subsection (d)(3) states that a joint venture which receives financial assistance from the Secretary may grant licenses to companies, including foreign companies, that are not members of the joint venture, for the use of intellectual property which the joint venture has developed, only if—

(A) licensing fees for the intellectual property are based on—

(i) the amount of research and development, product design, and manufacturing of products using the intellectual property that the company performs within the United States and Canada;

(ii) the percentage of domestically-manufactured components, including electronic components, used in products which incorporate the intellectual property; and

(iii) in the case of a foreign company, the amount of reciprocal access North American companies have to that company's home market, as determined by the Secretary; and

(B) in the case of a foreign company, that company, in the judgment of the Secretary, has not, within the past five years, engaged in dumping practices within the United States or engaged in practices, either in the United States or abroad,

which have the effect of infringing on or otherwise damaging the intellectual property rights of North American companies.

The Committee notes that subsection (d)(3)(A) does not by itself prohibit licensing to any party, foreign or domestic. It simply requires that any joint venture which receives ATP funds pursuant to subsection (b) (1) or (2) of this section set licensing fees according to a sliding scale based on the three criteria set forth in this subparagraph. Subsection (d)(3)(B) does establish a test for foreign companies, however, which, if failed, requires the joint venture to deny licenses. That test deals with dumping and with infringing on or otherwise damaging U.S. intellectual property rights.

In addition, the Committee intends that the term "engaged in dumping practices" be interpreted as meaning the same as the dumping provision in subsection (d)(2)(A)(iv), that is, either the parent or any related company of the foreign company has been identified within the previous five years as a "foreign manufacturer, producer, or exporter" as defined in section 771(9)(A) of the Tariff Act of 1930 (19 U.S.C. 1677(9)(A)) who has been found responsible for the sale of merchandise at less than fair market value within the meaning of section 731 of the Tariff Act of 1930 (19 U.S.C. 1673) with respect to two or more classes or kinds of merchandise.

Some U.S. companies have pre-existing cross-licensing agreements with foreign firms which require them automatically to share with those foreign firms any invention which the American company's personnel helped invent, possibly including any invention resulting from a joint R&D venture in which the U.S. company participates. These cross-licensing agreements are one way for U.S. companies to secure access to the best of foreign technology and therefore can enhance American competitiveness.

The Committee does not believe that intellectual property developed by taxpayer-assisted joint R&D ventures should automatically be shared with foreign firms, particularly those that engage in practices inconsistent with U.S. law and U.S. interests. The rationale for providing government seed money to joint R&D ventures is to help create a technological advantage for American companies. Furthermore, the Committee has seen no evidence that other governments permit such automatic transfer of intellectual property from their government-assisted joint R&D ventures. However, the limitations and conditions set forth under subsection (d)(3) regarding licensing may cause problems for U.S. companies which have these cross-licensing agreements. Therefore, the Committee intends to monitor this issue closely and to seek the recommendations of both U.S. companies and the Secretary on how to balance corporate needs with the interests of the American taxpayer. One option would be to require a one-year delay in the transfer of a joint venture's intellectual property to foreign companies not participating in the joint venture.

Subsection (d)(4) provides that the Secretary shall prescribe such rules and collect such information as may be necessary to monitor and enforce any requirements set forth in paragraphs (2) and (3) of this subsection.

Subsection (e) deals with interagency coordination. When reviewing private sector requests for DOC assistance to proposed joint

ventures, and when monitoring the progress of assisted joint ventures, the Secretary shall, as appropriate, coordinate with the Secretary of Defense and other senior Federal officials to ensure cooperation and coordination in Federal technology programs and to avoid unnecessary duplication of effort. The Secretary is authorized to work with the Secretary of Defense and other appropriate Federal officials to form interagency working groups or special project offices to coordinate Federal technology activities.

Furthermore, as appropriate, the Secretary shall coordinate ATP policies and activities with the economic, trade, and security policies of DOC to promote the economic competitiveness of U.S. industries. In addition, the Secretary, when so instructed by the President, shall coordinate these policies with the science, technology, economic, trade, and security policies of other Federal departments and agencies.

The Committee notes with approval that DOC is now working closely on technology matters with the DOD, particularly with the Defense Advanced Research Projects Agency (DARPA). NIST and DARPA do have different technology missions: DARPA funds basic technology work of particular interest or importance to specialized military missions, while NIST's role under the Trade and Competitiveness Act of 1988 is to help civilian industry develop and manufacture successful commercial products. NIST, therefore, puts particular emphasis on advanced manufacturing techniques and on providing the technical foundation necessary to make steady improvements in a wide range of product technologies. Nevertheless, the health of the civilian and defense sectors of the economy are increasingly intertwined. National defense cannot be maintained without a healthy civilian industrial base to provide components and products; and defense research, especially by DARPA, can be transferred to civilian companies to help ~~them~~ develop advanced commercial products. Therefore, the Committee commends the increased communication and cooperation between DOC and DARPA and encourages DOC to continue and strengthen that interaction.

Subsection (f) deals with advice and review. In order to analyze the need for and value of joint ventures in specific technical fields, evaluate any joint ventures for which no American companies request the Secretary's assistance, or monitor the progress of any joint venture which receives Federal funds or loan guarantees pursuant to the authorization contained in this section, the Section, the Secretary, the Under Secretary of Commerce for Technology, and the Director—

- (1) may organize and seek advice from such industry advisory committees as they consider useful and appropriate;
- (2) may organize an Advance Electronics Advisory Board for the purpose of bringing industry and government leaders together to explore options for research and development in advanced electronics, including advanced television; and
- (3) may commission studies or reviews by the National Research Council.

The Committee believes that, in order for an industry-led strategy for research and technology development to succeed, the Secretary and other DOC officials must have expert advice from industry leaders. Therefore, the Committee has included subsection (f).

The Committee particularly urges the Secretary to consider forming an Advanced Electronics Advisory Board. Electronics technology is undergoing rapid changes, including not only the development of high-definition systems but also greater interconnections among the computer, telecommunications, and consumer electronics industries. Since these developments are both complex and important, an advisory board could provide considerable assistance.

Subsection (g) contains definitions of "foreign company" and "North American company." The latter is where majority ownership is held by U.S. citizens, Canadian citizens, or a combination thereof.

SECTION 6.—REPORT ON HIGH-DEFINITION TELEVISION

The legislation gives the Secretary 90 days from its enactment to submit to Congress and the President a detailed report on the establishment of a domestically-based HDTV industry. That report:

(1) would identify the requirements of such an industry, the components of HDTV, production and transmission equipment related to HDTV programming, and the development and manufacture of products also related to the computer and telecommunications industries;

(2) would include not only issues covering technological incentives, but also issues related to licensing, regulations, international standards, international trade, and specialized financing problems; and

(3) would separately detail the recommendations of the Secretary on the value of Federal action, including the responsibilities of different administrative agencies, timelines and plans for coordination, requirements for legislative action, and funding.

The Committee notes that the administration has been conducting a review of the policy issues surrounding HDTV and high-definition systems in general. Since Congress must make major decisions regarding HDTV and high-definition systems, the Committee believes that the Secretary should submit a report to Congress this year.

In making recommendations for Federal action, the Committee directs the Secretary to analyze, among other items, what Federal agencies can do to help U.S. companies overcome technical barriers to the successful commercial development and manufacture of high-definition systems, steps the Federal government can take to reduce the cost of capital for the construction of industry's HDTV production facilities, and the role that Federal procurement or industry-government demonstration projects can play in helping to stimulate demand for a U.S.-based HDTV and high-definition systems industry.

SECTION 7.—AMENDMENT TO ADVANCED TECHNOLOGY PROGRAM PROVISIONS

This section amends section 28 of the Act of March 3, 1901 (15 U.S.C. 278n): (1) by redesignating subsection (e) as subsection (f); and (2) by inserting immediately after subsection (d) a new subsection (e).

Under new subsection (e)(1), the Secretary, for the purposes of managing the ATP, may employ such technical and professional personnel and fix their compensation without regard to the provisions of title 5, U.S. Code, as the Secretary may deem necessary for the discharge of responsibilities under this section.

Under new subsection (e)(2), the Secretary, under the authority provided by paragraph (1) of this subsection, may appoint for a limited term or on a temporary basis, scientists, engineers, and other technical and professional personnel on leave of absence from industrial, academic, or research institutions to work for the ATP.

Under new subsection (e)(3), the Secretary may pay, to the extent authorized for certain other Federal employees by section 5723 of title 5, U.S. Code, travel expenses for any individual appointed for a limited term or on a temporary basis and transportation expenses of his or her immediate family and his or her household goods and personal effects from that individual's residence at the time of selection or assignment to his or her duty station. The Secretary may pay such travel expenses and transportation expenses to the same extent for such an individual's return to the former place of residence from his or her duty station, upon separation from the Federal service following an agreed period of service. The Secretary may also pay a per diem allowance at a rate not to exceed the daily amounts prescribed under section 5702 of title 5, U.S. Code, to such an individual, in lieu of and when less than transportation expenses of the immediate family and household goods and personal effects, for the period of his or her employment with the ATP. Notwithstanding any other provision of law, the employer's contribution to any retirement, life insurance, or health benefit plan for an individual appointed for a term of one year or less, which could be extended for no more than one additional year, may be made or reimbursed from appropriations available to the Secretary.

The Committee intends that DOC and NIST administer the ATP in a vigorous and expert manner. However, the Committee does not intend that NIST's current personnel be overly diverted from their current duties in order to manage the ATP or that a large new bureaucracy be created to administer the program. Therefore, the ATP should be managed by a flexible organization, one able not only to bring in NIST laboratory personnel as appropriate but also to utilize outside specialists as needed. To enable the Secretary to use outside experts, the Committee believes that the Secretary should have the authority to hire temporary personnel from industry, State government and academia. The legislative language in section 7 is taken directly from the organic act for the NSF, an agency that has successfully hired and used temporary personnel for many years.

SECTION 8.—SALARY ADJUSTMENTS

In addition to any sums otherwise authorized by this legislation, this section authorizes to be appropriated to the Secretary for FY 1990 such additional sums as may be necessary to make any adjustments in salary, pay, retirement, and other employee benefits which may be provided for by law.

SECTION 9.—AVAILABILITY OF APPROPRIATIONS

This section states that appropriations made under the authority provided in this legislation shall remain available for obligation, for expenditure, or for obligation and expenditure for periods specified in the Acts making such appropriations.

SECTION 10.—ANNUAL INDUSTRIAL TECHNOLOGY REPORT

This section amends section 5 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3704) by adding a new subsection. That new subsection requires an annual industrial technology report.

Specifically, by February 15 of each year following the date of enactment of this subsection, the Secretary, through the Under Secretary, shall submit to Congress a report on the state of U.S. industrial technology. Each such report shall include, but not be necessarily limited to, information and analyses regarding the following topics:

(A) a list of what the Secretary and DOC technical experts consider to be the most economically important technologies and the estimated current and future size of domestic and international markets for products derived from these technologies;

(B) a list of the technologies and markets targeted by major trading partners for development or capture;

(C) the current state of U.S. product technology, process technology, and manufacturing capability in the fields of technology and the markets identified under subparagraph (A), as compared with the current levels of such technologies and manufacturing capability achieved, or future levels likely to be achieved, by major trading partners;

(D) the types of research and development needed to close any significant gaps or deficiencies in the technology base of the United States, as compared with the technology bases of major trading partners;

(E) private and public investments in the United States in research and development, including Federal research and development investments, by department and agency, in the specific fields of technology and the markets identified under subparagraph (A); Federal policies, including research policies, to promote U.S. industrial competitiveness in these technical fields and markets; and additional private and Federal actions that are needed to close gaps between the civilian technology base of the United States and the technology bases of major trading partners, including the steps necessary to ensure that NIST can provide U.S. companies with the support technologies needed to remain competitive in the fields of technology and markets identified under subparagraph (A);

(F) flows of industrial technology between the United States and major trading partners, including flows of technology through licenses and patent-sharing or cross-licensing, corporate investments and acquisitions, investments in universities and government laboratories, technical literature, and personnel exchanges, including annual foreign investments in, and

acquisitions of, high-technology firms or organizations within the United States; and

(G) any policies, regulatory obstacles, or other institutional problems which, in the judgment of the Secretary, adversely affect the creation and use of industrial technology in the United States or limit the contribution that Federal research and development makes to U.S. leadership in industrial technology.

Furthermore, the Secretary is authorized, to the extent permitted by other Acts, to collect such information as may be necessary to prepare the annual report required by this subsection. The Directors of OSTP, OMB, and NSF, as well as the heads of other Federal departments and agencies, are to provide such information and assistance in the preparation of the annual report as the Secretary may request.

The Committee intends that this report serve as a comprehensive summary of which technologies are most important, which nations lead in these technologies, foreign R&D programs in these areas, and current U.S. programs in these fields. The Committee notes that currently the Federal Government collects vast amounts of information on U.S. and foreign technology programs but that this information is not available in any single, easy-to-use document. The Committee does not intend that any single annual report be exceptionally long but does intend that the annual reports offer policymakers in Congress and the Executive Branch a broad overview of where the United States leads or lags in technologies that are important to both economic prosperity and national defense. The Committee believes that both NIST and DOC's Japanese Technical Literature Program can significantly assist the Secretary in the preparation of this annual report.

SECTION 11.—REPORT ON STRATEGY FOR REDUCING THE COST OF CAPITAL

This section states that within 120 days after the date of enactment of the bill, the Secretary shall submit to Congress a report on the cost of capital in the United States and its effect on the ability of U.S. companies to make the research, development, and production investments necessary to remain internationally competitive in major industrial sectors. The report shall include, but not necessarily be limited to, an analysis of the following topics—

(1) the real costs of capital paid by corporate borrowers in the United States and Japan over the 10 years immediately prior to enactment, including the costs of capital under government-backed loan programs in Japan;

(2) the payback periods typically associated with these various interest rates and the effect of these rates and payback periods on the ability and willingness of companies in the two countries to make long-term investments in new research and development, products, and manufacturing plants;

(3) The consequences for the economic competitiveness and trade balance of the United States if U.S. companies are unable to invest substantially in new areas such as advanced

television and related products, superconductivity, and advanced semiconductor production facilities;

(4) the expected levels of such costs of capital in the United States under various levels of U.S. budget deficits, trade deficits, and savings rates;

(5) the benefits and limitations of tax credits and other tax-based measures to reduce such costs of capital for U.S. companies, including their benefits and limitations in situations where initial investment costs are high, no profits are generated for several years, and therefore the company initially generates little or no profit for which taxes are assessed;

(6) an analysis of the effect of other options for reducing such costs of capital for U.S. companies, including low-cost loans and loan guarantees, and the feasibility of using these options to reduce the cost of capital for U.S. companies to levels that are near or at effective Japanese levels; and

(7) a proposed strategy for reducing such costs of capital for U.S. corporate borrowers to near or at effective Japanese levels.

Other Federal departments and agencies shall provide the Secretary with such information and assistance as the Secretary deems necessary to prepare this report. The Secretary is encouraged to consult with private sector officials and experts during the preparation of this report.

The Committee is greatly concerned that high costs of capital in the United States prevent American companies from making many of the substantial R&D and facilities investments which are necessary to stay competitive with Japan and other major trading partners. The Committee therefore directs the Secretary to prepare a report which both analyzes the situation and contains the Secretary's recommendations for a strategy to equalize the costs of capital in the United States with costs in Japan.

SECTION 12.—REPORT ON THE CREATION AND COMMERCIALIZATION OF COLLEGE AND UNIVERSITY RESEARCH

No later than six months after the date of enactment of the bill, the Secretary, with the participation of the Director of NSF, shall submit to Congress a program plan, including any necessary regulations, to establish and implement collaborative programs between the two agencies to—

(1) stimulate the transfer of federally-supported research to the private sector through steps to encourage and assist U.S. small businesses to develop and commercialize basic technologies created at colleges and universities; and

(2) assist academic researchers at a wide range of colleges and universities, including smaller institutions and institutions which do not traditionally receive large amounts of Federal research funds, to pursue high-quality research of economic potential and to transfer that research to the private sector.

In FY 1987, the Federal Government spent \$8.6 billion on science and engineering at American universities and colleges. The Committee believes that this large annual investment can make even greater contributions to national and local economic development

than is currently the case. The Committee is particularly interested in ways to stimulate greater cooperation between small businesses and researchers at a wide range of colleges and universities, including those which historically have not received large amounts of Federal research funds. Both NIST and NSF have on-going reviews of this issue, and this section would direct the Secretary, with the participation of the NSF Director, to submit to Congress a program plan on their existing and future collaborative programs in this area.

SECTION 13.—REPORTS ON MANUFACTURING

This section states that within 120 days after the date of enactment of the bill, the Secretary shall submit to Congress the following two reports:

(1) A report on the feasibility and advisability of establishing, in affiliation with NIST, a Quality Institute and a privately-funded foundation to support that Quality Institute, the purpose of which would be—

(A) to conduct workshops and company tours to share with managers, engineers, and production employees in the United States advanced techniques for improving manufacturing organization and productivity, including team-oriented organizational approaches to managing production technology and corporate research and development; and

(B) to help develop and disseminate model curricula in advanced manufacturing which might be used by technical colleges and other educational institutions to provide training to students and manufacturing company employees.

(2) A report analyzing the advantages and disadvantages of small manufacturing firms in the United States participating in new multi-company manufacturing centers, either on a local or regional scale, and what steps, if any, in the judgment of the Secretary, the Federal Government can and should take to encourage the development of such new organizations for manufacturing.

The Committee has long supported DOC efforts to help industry improve the quality of American products and manufacturing. In addition to supporting NIST's long-time work to improve measurement technology and quality control techniques, the Committee helped enact the Malcolm Baldrige National Quality Improvement Act of 1987 (P.L. 100-107), which established a national quality award and a rigorous process for evaluating applicants. One proposal is for a privately-funded foundation, perhaps affiliated with the Baldrige program, to help managers, engineers, and employees throughout the country learn from the American companies with the most successful quality improvement programs. Tours, workshops, and training courses might be part of the effort. Section 13(1) directs the Secretary to prepare a report on the feasibility and advisability of this proposal.

The Committee also notes that NIST, largely in cooperation with the Navy, is developing pioneering technology in the field of shared

manufacturing, that is, technology by which several users share a central, computer-controlled flexible manufacturing facility. At the same time, DOC's Office of Technology Policy is providing organizational advice to State and private groups interested in creating such facilities. Because DOC has developed considerable technology and expertise which could be transferred to other parts of the economy, section 13(2) directs the Secretary to prepare a report on this subject.

SECTION 14.—REPORT ON A STRATEGY TO STIMULATE COMPETITIVE RESEARCH

This section states that no later than February 1, 1990, the Director of OSTP shall submit to Congress a report presenting a proposed strategy for improving the university research capabilities of those States which historically have received relatively little Federal research and development funding. The report shall particularly discuss the feasibility and advisability of using NSF's Experimental Program to Stimulate Competitive Research (EPSCOR) as a model for similar programs in other Federal departments and agencies which fund research and development.

The report shall include, but not necessarily be limited to, an analysis and discussion of—

- (1) the geographic distribution of Federal research and development grants and contracts;
- (2) current Federal efforts to stimulate competitive research; and
- (3) the feasibility and advisability of new programs to stimulate competitive research in the National Aeronautics and Space Administration; the Departments of Defense, Energy, Agriculture, Health and Human Services, and the Interior; and the Environmental Protection Agency.

Over the years, the Committee has expressed strong support for NSF's EPSCOR. EPSCOR is an excellent way to build university research capabilities in States which historically have received little Federal R&D funding. The Committee believes that this NSF program has proven to be an effective, high-quality investment and now wishes to know whether other Federal agencies can or should establish similar or complementary programs. Therefore, section 14 directs the Director of OSTP to prepare a report presenting a proposed strategy for improving university research capabilities in these States.

CHANGES IN EXISTING LAW

In compliance with paragraph 12 of rule XXVI of the Standing Rules of the Senate, changes in existing law by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new material is printed in *italic*, existing law in which no change is proposed is shown in *roman*):

THE ACT OF MARCH 3, 1901

Section 26 of that Act

ASSISTANCE TO STATE TECHNOLOGY PROGRAMS

SEC. 26. (a) * * *

(b) * * *

(c) *There is established within the Institute an Office of Industrial Technology Services, which shall supervise the Centers program, the Institute's assistance to State technology programs, and such other activities or programs as the Secretary, Under Secretary, or Director may specify.*

Section 28 of that Act

ADVANCED TECHNOLOGY PROGRAM

SEC. 28. (a) * * *

(e)(1) *The Secretary may, for the purposes of managing the Program, employ at the Institute such technical and professional personnel and fix their compensation without regard to the provisions of title 5, United States Code, as the Secretary may deem necessary for the discharge of responsibilities under this section.*

(2) *The Secretary may, under the authority provided by paragraph (1) of this subsection, appoint for a limited term or on a temporary basis, scientists, engineers, and other technical and professional personnel on leave of absence from industrial, academic, research, or State institutions to work for the Program.*

(3) *The Secretary may pay, to the extent authorized for certain other Federal employees by section 5723 of title 5, United States Code, travel expenses for any individual appointed for a limited term or on a temporary basis and transportation expenses of his or her immediate family and his or her household goods and personal effects from that individual's residence at the time of selection or assignment to his or her duty station. The Secretary may pay such travel expenses and transportation expenses to the same extent for such an individual's return to the former place of residence from his or her duty station, upon separation from the Federal service following an agreed period of service. The Secretary may also pay a per diem allowance at a rate not to exceed the daily amounts prescribed under section 5702 of title 5, United States Code, to such an individual, in lieu of and when less than transportation expenses of the immediate family and household goods and personal effects, for the period of his or her employment with the Program. Notwithstanding any other provision of law, the employer's contribution to any retirement, life insurance, or health benefit plan for an individual appointed for a term of one year or less, which could be extended for no more than one additional year, may be made or reimbursed from appropriations available to the Secretary.*

[(e)] (f) *As used in this section, the term "joint research and development venture" has the meaning given to such term in section 2(a)(6) of the National Cooperative Research Act of 1984 (15 U.S.C. 4301(a)(6)).*

STEVENSON-WYDLER TECHNOLOGY INNOVATION ACT OF 1980

Section 5 of that Act

SEC. 5. COMMERCE AND TECHNOLOGICAL INNOVATION.

(a) through (e) * * *

(f) *ANNUAL INDUSTRIAL TECHNOLOGY REPORT.*—(1) By February 15 of each year following the date of enactment of this subsection, the Secretary, through the Under Secretary, shall submit to Congress a report on the state of United States industrial technology. Each such report shall include, but not be limited to—

(A) a list of what the Secretary and Department of Commerce technical experts consider to be the most economically-important technologies and the estimated current and future size of domestic and international markets for products derived from these technologies;

(B) a list of the technologies and markets targeted by major trading partners for development or capture;

(C) an assessment of the current state of United States product technology, process technology, and manufacturing capability in the fields of technology and the markets identified under subparagraph (A), as compared with the current levels of such technologies and manufacturing capability achieved, or future levels likely to be achieved, by major trading partners;

(D) an identification of the types of research and development needed to close any significant gaps or deficiencies in the technology base of the United States, as compared with the technology bases of major trading partners;

(E) an analysis of private and public investments in the United States in research and development, including Federal research and development investments, by department and agency, in the specific fields of technology and the markets identified under subparagraph (A); a summary of Federal policies, including research policies, to promote United States industrial competitiveness in those fields of technology and markets; and an analysis of what additional private and Federal actions are needed to close gaps between the civilian technology base of the United States and the technology bases of major trading partners, including what steps are necessary to ensure that the Institute can provide North American companies with the support technologies needed to remain competitive in those fields of technology and markets;

(F) an evaluation of flows of industrial technology between the United States and major trading partners, including flows of technology through licenses and patent-sharing or cross-licensing, corporate investments and acquisitions, investments in universities and government laboratories, technical literature, and personnel exchanges, and a summary and analysis of annual foreign investments in, and acquisitions of, high-technology firms or organizations within the United States; and

(G) a statement concerning any policies, regulatory obstacles, or other institutional problems which, in the judgment of the Secretary, adversely affect the creation and use of industrial technology in the United States or limit the contribution that

Federal research and development makes to United States leadership in industrial technology.

(2) The Secretary may, to the extent permitted by other Acts, to collect such information as may be necessary to prepare the annual report required by this subsection.

(3) The Directors of the Office of Science and Technology Policy, the Office of Management and Budget, and the National Science Foundation, as well as the heads of other Federal departments and agencies, shall provide such information and assistance in the preparation of the annual report as the Secretary may request.

